

CLAIMS

What is claimed is:

1. An operational amplifier for operating in a number of different operational modes, wherein
5 within each different operational mode the operational amplifier functions with different performance characteristics.
2. A multi-mode operational amplifier comprising:
an amplifier arranged to amplify a difference between a first input and a second input so
10 as to provide a differential output; and
mode selection circuitry coupled to the amplifier and arranged to provide an output signal to the differential output, wherein the output signal operates to control a number of different operational modes for the amplifier.
- 15 3. The multi-mode operational amplifier of claim 2, wherein the mode selection circuitry is coupled to the first input and the second input so as to provide the output signal to control a mode of the amplifier based on the first input and the second input.
4. The multi-mode operational amplifier of claim 2, wherein the mode selection circuitry is
20 arranged to provide at least five different operational modes for the amplifier.
5. The multi-mode operational amplifier of claim 2, wherein the different operational modes include modes having different levels of performance characteristics of the amplifier.

6. The multi-mode operational amplifier of claim 2, wherein the different operational modes include modes selected from the group consisting of disabled, minimally enabled, intermediately enabled, and maximally enabled.

5 7. The multi-mode operational amplifier of claim 2, wherein the mode selection circuitry comprises:

selectable input stage circuitry arranged to be enabled or disabled; and
selectable output stage circuitry arranged to be enabled or disabled.

10 8. The multi-mode operational amplifier of claim 7, wherein the different operational modes comprise modes selected from the group consisting of enabling both of the selectable input stage circuitry and the selectable output stage circuitry, enabling the selectable input stage circuitry and disabling the selectable output stage circuitry, disabling the selectable input stage circuitry and enabling the selectable output stage circuitry , and disabling both of the selectable input
15 stage circuitry and the selectable output stage circuitry.

9. The multi-mode operational amplifier of claim 8, wherein when the selectable output stage circuitry is enabled, the amplifier is a linear amplifier.

20 10. The multi-mode operational amplifier of claim 8, wherein when the selectable input stage circuitry and the selectable output stage circuitry are both enabled, a supply current to the amplifier increases.

11. The multi-mode operational amplifier of claim 8, wherein when the selectable input stage circuitry is enabled, a unity gain bandwidth of the amplifier increases.

12. The multi-mode operational amplifier of claim 8, wherein when the selectable input stage
5 circuitry is enabled, an input-referred noise value of the amplifier decreases.

13. The multi-mode operational amplifier of claim 8, wherein the selectable input stage circuitry comprises:

10 a bias circuit to provide a reference;
a first differential amplifier coupled to the reference; and
a second differential amplifier arranged to provide a differential output based on the first
input and the second input.

14. The multi-mode operational amplifier of claim 8, wherein the selectable input stage circuitry
15 comprises:

a bias circuit to provide a reference; and
an output amplifier coupled to the reference and arranged to provide the output signal to
the differential output.

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15. A multi-mode operational amplifier comprising:

a differential amplifier coupled to a pair of input terminals and arranged to provide an output signal on a differential amplifier output;

a selectable input stage circuit coupled to the pair of input terminals and arranged to provide a second output signal on a second differential amplifier output; and

a selectable output stage circuit coupled to the second differential amplifier output and based on whether one or both of the selectable input stage circuit and the selectable output stage circuit are enabled, the selectable input stage circuit or the selectable output stage circuit provides a control signal to the differential amplifier output, wherein the control signal operates to control a performance characteristic of the differential amplifier.

16. The multi-mode operational amplifier of claim 15, wherein the control signal controls performance characteristics of the differential amplifier selected from the group consisting of supply current, unity gain bandwidth, input-referred noise level, and a linearity of the differential amplifier.

17. The multi-mode operational amplifier of claim 15, wherein the differential amplifier includes:

a bias circuit for creating a reference;

an input stage for forming a difference signal between a negative and a positive input present on the pair of input terminals; and

an output stage coupled to the reference and the difference signal and operable to either increase a voltage on the differential amplifier output or decrease a voltage on the differential amplifier output.

5 18. The multi-mode operational amplifier of claim 15, wherein the selectable input stage circuit comprises:

a bias circuit for creating a reference; and

an input stage differential amplifier coupled to the pair of input terminals and arranged to form a difference signal between signals on the pair of input terminals and to
10 provide the difference signal to the differential amplifier and the selectable output stage circuit.

19. The multi-mode operational amplifier of claim 18, wherein the selectable output stage circuit comprises:

15 a bias circuit for creating a reference; and

an output amplifier coupled to the reference and the difference signal and operable to either push a voltage on the differential amplifier output down or pull a voltage on the differential amplifier output up.

20 20. The multi-mode operational amplifier of claim 15, wherein the differential amplifier includes enable circuitry that performs as a switch to either fully enable or disable the differential amplifier.

21. The multi-mode operational amplifier of claim 15, wherein the selectable input stage circuit includes enable circuitry that performs as a switch to either fully enable or disable the selectable input stage circuit.

5 22. The multi-mode operational amplifier of claim 15, wherein the selectable output stage circuit includes enable circuitry that performs as a switch to either fully enable or disable the selectable output stage circuit.

23. An operational amplifier comprising:

10 a bias circuit arranged to provide a reference;
an input stage including a differential amplifier, wherein the input stage is coupled to a pair of input terminals and is arranged to create a difference signal between signals on the pair of input terminals;
an output stage coupled to the reference, to the difference signal, and to a differential
15 amplifier output and is arranged to provide an output signal on the differential amplifier output;
a parallel input stage coupled to the reference and arranged to provide a second output signal on a second differential amplifier output; and
a parallel output stage coupled to the second differential amplifier output and arranged to
20 output a control signal to the differential amplifier output.

24. The operational amplifier of claim 23, wherein the parallel input stage and the parallel output stage include enable circuitry arranged to enable or disable operation of the parallel input stage and the parallel output stage.

5 25. The operational amplifier of claim 24, wherein the parallel input stage provides the second output signal on the second differential amplifier output based on whether the parallel input stage is enabled.

26. The operational amplifier of claim 24, wherein the parallel output stage outputs the control
10 signal to the differential amplifier output based on whether the parallel output stage is enabled.

27. The operational amplifier of claim 23, wherein the control signal controls performance characteristics of the operational amplifier.

15 28. The operational amplifier of claim 23, wherein the second output signal controls operational modes for the operational amplifier.

29. The operational amplifier of claim 23, wherein the control signal controls operational modes for the operational amplifier.

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